

General Physics

SYNCHRONIZING A HOLLOW CATHODE DISCHARGE LAMP WITH A DIODE LASER – Theory, Thomas A. Juskevics, Justin. D. Berry, Brian K. Clark*, and Epaminondos Rosa, Jr. *, Department of Physics, Campus Box 4560, Illinois State University, Normal, IL 61790-4560, bkc@phy.ilstu.edu.

The optogalvanic effect (OGE) is a spectroscopic technique in which photons from a light source interact with a plasma discharge to change its electrical properties. In our case, the photons are supplied by a tunable diode laser and interact with the plasma of a neon hollow cathode lamp. When the laser is tuned to an allowed optical absorption transition for the lamp, its electrical properties change and can be detected by monitoring the discharge potential. Since the laser light can modify the discharge characteristics, a signal embedded in the laser modulation should be transferred to the plasma discharge. Transfer of information from the laser to the discharge should allow the two devices to become partially synchronized. Here we describe the theory behind synchronization of the coupled diode laser and plasma discharge.